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SEASONAL AWARENESS AND ALERT LETTER (SAAL)

For Epidemic-prone infectious diseases in Pakistan

Summer / Monsoon Season

OBJECTIVES OF SAAL

- To alert concerned health authorities and professionals at all levels regarding the epidemic-prone infectious diseases during the monsoon /summer season.
- To facilitate the preparations for timely and efficient response to the encountered alerts / outbreaks / epidemics and thus reduce the associated morbidity and mortality.

DATA SOURCES

The available national data collected during 2014 to 2019 by FE&DSD, NIH, Provincial Health Departments, Provincial Disease Surveillance & Response Units(PDSRUs), Expanded Program on Immunization (EPI), Directorate of Malaria Control and laboratory-based data from NIH have been analyzed to assess the exhibited patterns of high priority communicable diseases.

The description of all priority diseases has been arranged in an alphabetical order. Additionally, under the section of National Potential Public Health Events, technical details on HIV, Heat Stroke and Naegleria Fowleri infection are included. Ebola Virus disease, Nipah Virus and Middle East Respiratory Syndrome Corona Virus (MERS CoV) infection have been shared as International Potential Public Health Events.

Outbreak - Prone Diseases	Alerts
Cholera (Acute Watery Diarrhea)	
Chikungunya	
Crimean Congo Hemorrhagic Fever (CCHF)	
DengueFever	
Diphtheria	
Leishmaniasis	
Malaria	
Measles	
Meningococcal Meningitis	
Pertussis	
Poliomyelitis	
Typhoid Fever	
Viral Hepatitis(Acute)	

	High Alert-peak occurrence in the season
	Medium Alert-cases will been countered and any show up as an outbreak

Cholera (Acute Watery Diarrhea)

Introduction: Cholera is an acute, diarrheal illness caused by infection of the intestine due *to bacterium Vibrio cholerae*. An estimated 3-5 million cases and over 100,000 deaths occur each year around the world (1).

Clinical Picture: Cholera infection is often mild or without symptoms but can sometimes be severe and life threatening. Approximately 5-10% infected persons in the early stages have severe disease characterized by profuse watery diarrhea, vomiting, and leg cramps. In these cases, rapid loss of body fluids may lead to dehydration, shock or death (1).

Reservoir of Infection: Humans and aquatic environment are reservoirs for *V. cholerae* O1 and O139. Humans are considered the primary reservoir and can be asymptomatic carriers (2).

Infectious Agent: *Vibrio cholerae* (1)

Mode of transmission: Infection results from ingestion of organisms present in contaminated food and water or directly from person to person through the fecal-oral route (3)

Incubation period: Few hours to 5 days (4)

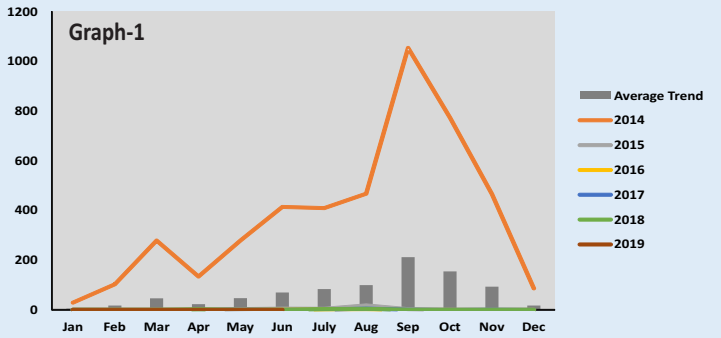
Infectivity period: The contagious period for cholera begins as soon as the organism is excreted in the feces. This can occur as early as about 6 to 12 hours after exposure to the bacteria and can last for about 7 to 14 days (5).

Seasonality: Throughout the year; although higher incidence from May to November, during hot, humid and rainy season (6).

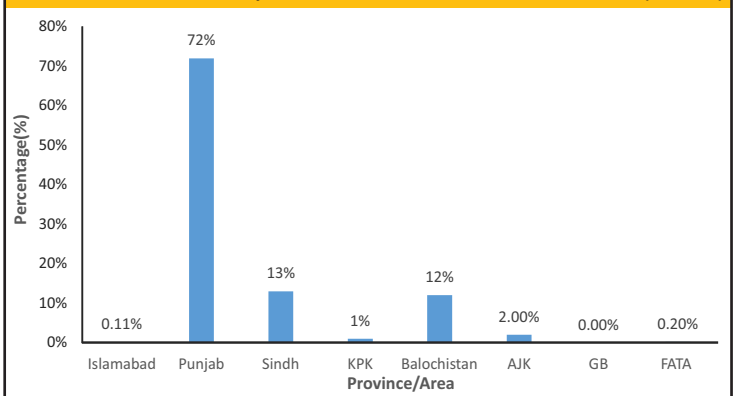
Lab confirmed AWD cases by months in Pakistan, 2014-June 2019 (n=4,551) - Graph 1

Geographical Distribution in Pakistan: During 2014 to June 2019 in Pakistan 72% (n=3,285) cases were reported form Punjab followed by Sindh13% (n=570) and Balochistan12% (n=558)

Lab Confirmed AWD Cases by months in Pakistan, 2014-June 2019 (n=4,551)



Lab Confirmed AWD Cases by Province/Areas in Pakistan, 2014-June 2019 (n=4,551)



Confirmed Case: Any suspected case confirmed through isolation of *Vibrio cholerae* O1 or O139 from the stool (7).

Specimen Collection and Transportation:

- Place specimen in clean container and transport to laboratory within two hours of collection at room temperature

- If there is a 72 hours delay, place stools soaked swab in a Cary-blair transport medium (7).

Case Management: Low osmolar ORS should be given orally after every hour. Even with severe dehydration, Intravenou select rolyte solutions should be used only for initial re-hydration, including those who are in shock. Severely dehydrated patients require administration of intravenous fluids. Ringer's Lactate Solution (Hartman's Solution) is the preferred fluid for intravenous rehydration. Antibiotics (Doxycycline, Ciprofloxacin, Cefixime, Co-trimoxazole, Erythromycin) reduce the duration of disease and period of excretion of *V. cholerae* in the stool of infected patient (7).

Preventive measures & vaccination: Ensuring adequate safe drinking water supply and proper sanitation. To make water safe for drinking, either boil the water or chlorinate it (7). People (visitors or residents) in areas where cholera is occurring or has occurred should observe the following recommendations:

- Drink only bottled, boiled, or chemically treated water and bottled or canned carbonated beverages. When using bottled drinks, make sure that the seal has not been broken.
- Use bottled, boiled or chemically treated water to wash dishes, wash and prepare food or make ice.
- To disinfect water: boil for 1 minute or filter the water and add 2 drops of household bleach or ½ an iodine tablet per liter of water.
- Avoid tap water and fountain drinks.
- Wash your hands often with soap and clean water.
- If no water and soap are available, use an alcohol-based hand cleaner (with at least 60% ethyl alcohol).
- Clean your hands especially before you eat or prepare food and after using the bathroom.
- Eat freshly cooked food, served hot.
- Do not eat raw and undercooked meats and seafood or unpeeled fruits and vegetables should also be avoided.
- Dispose off feces in a sanitary manner to prevent contamination of water and food sources (4).

Vaccination: A single-dose live oral cholera vaccine called Vaxchora (lyophilized CVD 103-HgR) for adults 18 - 64 years old is recommended who are traveling to an area of active cholera transmission. Two other oral inactivated or non-live cholera vaccines, Dukoral® and ShanChol®, are World Health Organization (WHO) prequalified. No cholera vaccine is 100% protective and vaccination against cholera is not a substitute for standard prevention and control measures (4).

References: References are available in online version at www.nih.org.pk

CRIMEAN-CONGO HEMORRHAGIC FEVER (CCHF)

Introduction: A Tick-borne zoonotic viral disease that is asymptomatic in infected animals, but is a serious threat to humans (1). Human infections begin with nonspecific febrile symptoms, but progress to a serious hemorrhagic syndrome with a high case fatality rate (10-40%) (2). It is one of the most widely distributed viral hemorrhagic fevers occurring in parts of Africa, Middle-East, Asia and Europe. CCHF is endemic in Pakistan with sporadic outbreaks. (3). Occurrence of virus is correlated with the distribution of *Hyalomma* Tick species (Principle vector) (4)

Clinical Picture: Sudden onset with initial signs and symptoms including headache, high grade fever, backache, joint pain, upper abdominal pain, vomiting, redness of eyes, flushed face, sore throat, and petechiae (red spots) on the palate are common. Symptoms may include jaundice along with changes in mood and sensory perception. With progression of the illness, large areas of severe bruising, severe nose bleeds, and uncontrolled bleeding at injection sites can be seen, usually beginning on the fourth day of illness and lasting for about two weeks(5).

Infectious Agent: Crimean-Congo Hemorrhagic Fever (CCHF) Virus belongs to *Bunyaviridae* family (1)

Reservoir: *Hyalomma* Tick and domestic animals, such as cattle, goats, sheep, wild animals/rodents, such as hedgehogs, rats, hares and birds are generally resistant with the exception of Ostrich(6).

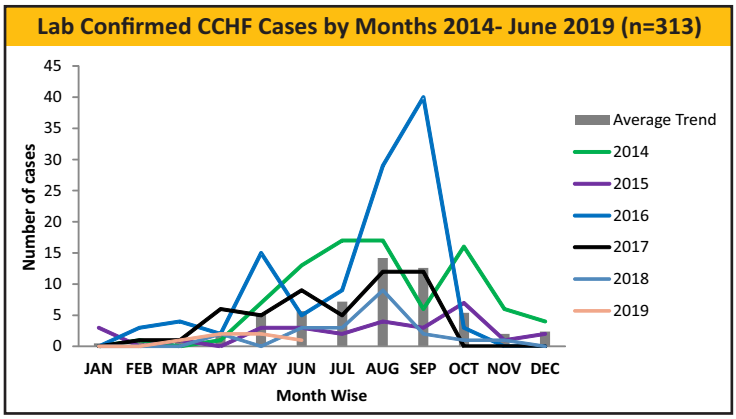
Mode of transmission: Bite of the infected *Hyalomma tick,* handling of tick infested animals, direct contact with blood / tissue of infected domestic animals (slaughtering), or direct contact with blood / tissue of infected patients. Nosocomial infections are common sources of transmission (7).

Incubation Period:

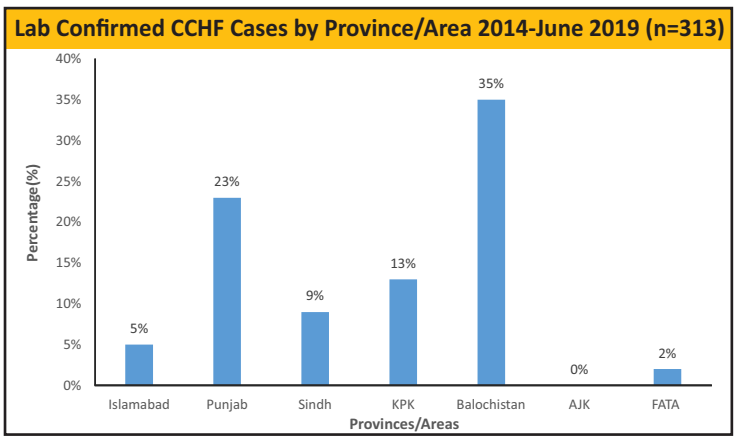
1-3 days after tick bite

5-6 days after exposure to infected blood or tissue with a documented maximum of 13 days (8).

Seasonality: Peak of cases occur during Fall and Spring seasons, associated with life-cycle of ticks, exposure of new born animals, exposure of migrating animals(9).



Geographical Distribution in Pakistan: Since the diagnosis of first human case of CCHF in 1976, the sporadic cases have continued to occur, mostly from different areas of Pakistan and predominantly from Balochistan (10).



Alert Threshold: One probable case is an alert and requires immediate investigation (11).

Outbreak Threshold: One lab confirmed case of CCHF is an outbreak(11).

Case definitions:

Suspected Case: Any person with sudden onset of fever over 38.5°C for more than 72 hours and less than 10 days, especially in a CCHF endemic area and those in contact with livestock such as shepherds, butchers, animal handlers and health care personals (11).

Probable Case: Suspected case with history of febrile illness for 10 days or less with epidemiological link AND any two of the following: thrombocytopenia less than 50,000/mm3, petechial or purpuric rash, epistaxis, hematemesis, hemoptysis, blood in urine and/or stools, ecchymosis and gum bleeding (11).

Confirmed Case: Suspected/Probable case confirmed through PCR and/or serology (11).

Laboratory Confirmation: Detection of viral nucleic acid by PCR in blood specimen. Confirmation of presence of IgM antibodies in serum

by ELISA (Enzyme-Linked Immunoassay) (11).

Specimen Collection and Transportation: Collect 3-5ml of blood in a vacutainer observing strict bio safety precautions. Keep in upright position to prevent hemolysis. Transport to the laboratory in triple package with ice packs or frozen with dry ice along with a prominent Bio-Hazard label and complete lab request form with brief history of the patient (11).

Case Management:

- Patients with probable or confirmed CCHF should be isolated and cared for using strict barrier-nursing techniques with recommended Infection Prevention & Control (IPC) measures i.e. standard plus contact precautions. Use additional precautions,(droplet/aerosol) in case of any extensive contact/ procedure.
- Only designated medical / para-medical staff and attendants should attend the patient.
- All medical, para-medical staff and attendants should wear recommended Personal Protective Equipment(PPEs) before entering the isolation room and dispose it properly after use.
- All secretions of the patient and hospital clothing in use of the patient and attendants should be treated as infectious and where possible, should be autoclaved before incinerating.
- Every effort should be made to avoid spills, pricks, injury and accidents during the management of patients. Needles should not be re-capped but discarded in a proper safety disposal box.
- All used material e.g. syringes, gloves, cannula, tubing etc. should be collected in autoclaveable bags and should be autoclaved before incinerating.
- After the patient is discharged, room surfaces should be wiped down with disinfectant like Sodium Hypochlorite 10% solution and the room should be fumigated in case of risk for tick infestation (12).

Treatment: General supportive therapy is the mainstay of patient management in CCHF. Intensive monitoring according to guide volume and blood component replacement is recommended. If the patient meets the case definition for probable CCHF, oral Ribavirin needs to be initiated immediately in consultation with the attending physician. Studies suggest that Ribavirin is most effective if given in the first 6days of illness. Oral Ribavirin: 30 mg/kg as loading dose, followed by 16 mg/kg every 6 hours for 4 days and then 8 mg/kg every 8 hours for 3 days.

Prophylaxis Protocol: The efficacy for post exposure Ribavirin in the management of hospital associated CCHF infection, remains anecdotal. It may be given in a high loading dose (35 mg/kg orally followed by 15mg/kg three times daily for 10 days) and only for high-risk sings e.g. needle stick injury, mucous membrane contamination, emergency resuscitative contact, or prolonged intimate exposure during after baseline blood tests.

Household or other contacts of the case who may have been exposed to infected ticks or animals, or who recall indirect contact with case body fluids should be monitored for 14 days from the date of last contact with the patient or other source of infection by taking the temperature twice daily. If the patient develops temperature of 38.5°C or greater, headache and muscle pains, he/she would be considered as a probable case and should be admitted to hospital and started on Ribavirin treatment ASAP(12).

Preventive measures & vaccination:

- Educate public about the mode of transmission and about Personal Protection.
- Persons living in endemic areas must be educated on:
  - Avoidance of areas where tick vectors are abundant, especially when they are active (spring to fall).
  - Regular examination of clothing and skin for ticks, and their removal (without crushing them).
  - Wearing light colored clothing, covering legs and arms, and using repellents on the skin.
- Other measures, such as wearing gloves or other protective clothing to prevent skin contact with infected tissue or blood, may be taken by persons who work with livestock or other animals.
- For tick control, animal dipping/spraying in an insecticide solution is used. Injectable insecticide like Ivermectin is also recommended.
- Butchers should wear gloves and other protective clothing to prevent skin contact with freshly slaughtered meat, blood and other tissues. Meat should drain for at least 30 minutes, before distribution to public.
- Hospitals in endemic areas should ensure universal precautions in OPD, Emergency Rooms, ensure injection safety measures and maintain stock of Ribavirin with PPEs.
- Bio-safety is the key element to avoid nosocomial infection. Patients with suspected or confirmed CCHF must be isolated and cared for by using barrier-nursing techniques to prevent transmission of infection to health workers and others.
- In case of death of patient due to CCHF, family members should be advised to follow safe burial practices.
- Exposed contacts: - those with high risk exposure (needle stick, sharps, blood or body fluids contacts) should be observed for fever for 14 days. If fever develops, Ribavirin should be started immediately (12).
- There is no approved vaccine available (13).

References: References are available in online version at www.nih.org.pk

DENGUE FEVER

Introduction: Dengue is a mosquito-borne viral disease (also known as break bone fever), causes flu-like illness, and occasionally develops into a potentially lethal complication called severe Dengue. The global incidence of Dengue has grown dramatically in recent decades and about half of the World's population is now at risk(1). The first confirmed outbreak of Dengue fever in Pakistan was in 1994, but a sudden rise in cases and the annual epidemic trend first occurred in Karachi in November 2005(2).

Clinical Picture:

Dengue Fever: Dengue fever is defined by fever (for>3 days and<10days) as reported by the patient or healthcare provider and the presence of one or more of the following signs and symptoms i.e. nausea/vomiting, rash, aches and pains (e.g., headache, retro-orbital pain, joint pain, myalgia, arthralgia), tourniquet test positive, Leukopenia (Platelets count <150,000).

Dengue Hemorrhagic Fever: Defined as Dengue fever with any one or more of the warning signs i.e. severe abdominal pain or persistent vomiting, red spots or patches on the skin, bleeding from the nose or gums, blood in vomiting, black tarry stools (feces, excrement), drowsiness or irritability, pale, cold or clammy skin, difficulty in breathing, a total white blood cells count of <50,000/mm3 and Platelets count <100,000.

OR

Dengue Shock Syndrome: Defined as Dengue fever with any one or more of the following scenarios:

Severe plasma leakage evidenced by hypovolemic shock and/or extravascular fluid accumulation (e.g., pleural or pericardial effusion, ascites) with respiratory distress, severe bleeding from the gastrointestinal tract and vital organs involvement (3).

In 1-3% of cases, the disease develops into the life-threatening Dengue hemorrhagic fever (DHF), some times progressing into Dengue shock syndrome (DSS) (4).

Infectious Agent (5): Belonging to Flavivirus group; four different Dengue viruses (sero types) are known: DEN1,DEN2, DEN3, andDEN4.

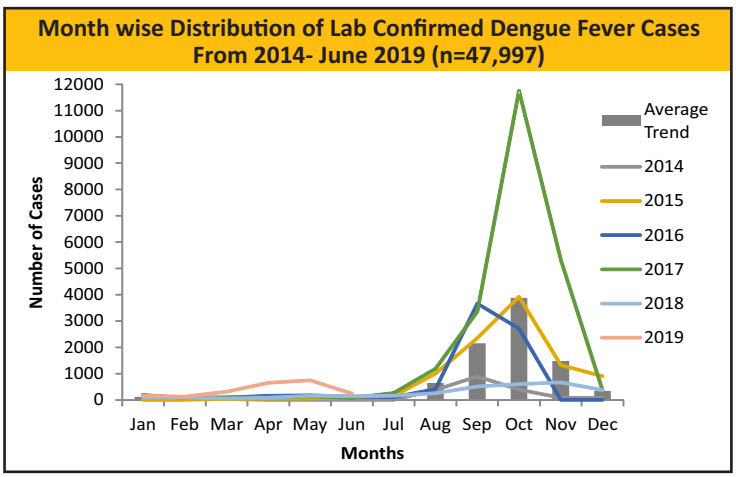
Mode of transmission: Bite of infected mosquitoes, Aedes Aegypti and Aedes Albopictus(6).

Incubation period: 3-14 days (average 4-7 days) after the infective

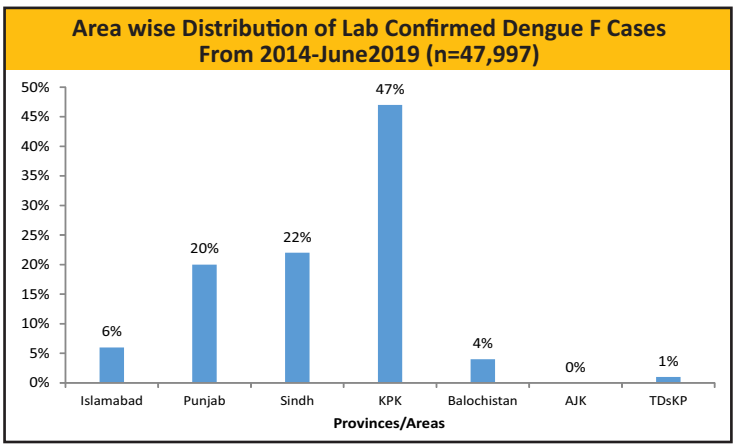
bite (7).

Period of communicability: 2–7 days (7).

Seasonality: Cases are increased during and after rainy seasons as compared to winter and summer seasons. Relatively humidity, temperature and rain remained significant predictors of dengue incidence in Pakistan. Surge of cases occurred during September to October (8)



Geographical distribution: During 2012-2016, KP remained the most affected area with Dengue r in Pakistan.



Alert Threshold: Dengue Fever: Cluster of 3 suspected cases with atleast one confirmed (10).

Alert Threshold; Dengue Hemorrhagic Fever: One probable case is an alert and requires an immediate investigation to assess differential diagnosis with CCHF

Outbreak threshold: Cluster of 6 suspected cases and one lab confirmed case is an outbreak (10).

Case Definitions:

Suspected Case: A clinically compatible case of Dengue fever, or Dengue hemorrhagic fever with an epidemiologic linkage (11)

Probable Case: A clinically compatible case of Dengue fever, or Dengue hemorrhagic fever with laboratory results indicative of probable infection (11)

Confirmed Case: A clinically compatible case of dengue fever, or Dengue hemorrhagic fever with confirmatory laboratory results (11).

Lab Confirmation: Probable; Detection of IgM antic-DENV by validated immunoassay in a serum specimen

Confirmatory Test: Detection of DENV nucleic acid in serum/plasmaby PCR, detection in serum or plasma of DENV Non Structural Protein1(NS1) antigen by a validated immunoassay

Timings: PCR: Initial 4–5 days of onset of illness.

NS1: One day post onset of symptoms (DPO) up to 18 DPO

Serology: IgM antibodies are detectable after 4th day of onset of illness. IgG is used for the detection of past dengue infection and usually can be detected during 2nd week of illness (11).

Specimen Collection and Transportation: Collect 5 ml of blood, centrifuge, and separate serum for analysis, observing strict safety precautions. Transport serum specimens to the lab in triple container packing with ice packs or frozen with dry ice (for long distance) along with a prominent bio hazard label and complete lab request form with brief history of the patient (10).

Case Management:

Febrile Phase: In the early febrile phase, it is not possible to distinguish DF from DHF. The treatment during febrile phase is symptomatic and mainly supportive, as follows:

Paracetamol 10 mg/kg/dose in children and 500-1,000 mg/dose in adult. Maximum adult dose is 4 grams/day. Do not give Aspirin or other NSAID like Ibuprofen.

Extra amounts of fluids Oral rehydration therapy (ORT/ ORS) is recommended for patients with moderate dehydration. Complete blood count (CBC/CP) with follow up is an important tool in management of suspected dengue patients .Provide brochure for families about the "warning signs" together with other recommendation. All Dengue patients must be carefully observed with signs of shock for at least 24 hours after recovery from fever.

The patient who does not have any evidence of circulatory disturbance and who has been afebrile for > 24 hours does not need further observation and may be discharged (10) .

Protocol for management according to Phases of DHF

(1) Dengue hemorrhagic fever (DHF) Grades I and II: As in DF, during the afebrile phase of DHF Grades I and II, the patient has the same symptoms as during the febrile phase. The clinical signs plus thrombocytopenia and rise in hematocrit are sufficient to establish a clinical diagnosis of DHF. During this situation hospitalize the patient and treat accordingly.

(2) DHF Grades III and IV (DSS): Common manifestations observed during the afebrile phase of DHF Grade III are circulatory failure manifested by rapid and weak pulse, narrowing of the pulse pressure characterized by high diastolic pressure relative to systolic pressure, e.g. 90/80 mm of Hg (this is usually due to plasma leakage) or hypotension (possibly due to bleeding), the presence of cold clammy skin and restlessness or lethargy.

Immediately shift the patient to Intensive care unit (ICU) and treat accordingly. The mortality is up to 30% without treatment but less than 1% with adequate treatment by experienced physician indedicated facility (10).

Preventive Measures: Community survey to determine density of vector mosquitoes .Identify and destroy mosquito larval habitats and indoor breeding sites. Community mobilization should be conducted through schools, religious leaders, to promote health education campaigns. Proper solid waste disposal and improved water storage practices, including covering containers to prevent access by egg-laying female mosquitoes. Protection against day biting mosquitoes including use of screening, protective clothing and repellents (10).

Vaccination: In late 2015 and early 2016, the first Dengue vaccine, Dengvaxia (CYD-TDV) was registered in several countries for use in Individuals aged 9-45 years living in endemic areas (12). WHO recommends that countries should consider introduction of the Dengue vaccine CYD-TDV only in geographic signs (national or subnational) where epidemiological data indicate a high burden of disease (13).

References: References are available in online version at www.nih.org.pk

LEISHMANIASIS

Introduction: Leishmaniasis is a parasitic disease and is classified as a Neglected Tropical Disease (NTD). It can present as cutaneous, mucosal and visceral forms but the most common form is cutaneous Leishmaniasis (1).

Leishmaniasis is found in areas of more than 90 countries in the tropics, subtropics, and southern Europe. The annual incidence of new cases is estimated between 1.5 and 2 million. Geographical distribution of the disease depends on sand fly species acting as vectors [2].

Infectious agent: Leishmaniasis is caused by a *protozoa parasite* from over 20 Leishmania species [1].

Mode of transmission: Spread by the bite of the sand fly on the skin. If animals are the primary host reservoirs, it is called Zoonotic Leishmaniasis, if humans are the primary host reservoirs is called Anthroponotic Leishmaniasis. (Human-sand fly-human)[1].

Incubation period: Considered to be at least a week but may extend up to several months [3].

Clinical Features:

(A) Visceral Leishmaniasis (VL): Also known as kala-azar is fatal if left untreated in over 95% of cases. It is characterized by irregular bouts of fever, weight loss, enlargement of the spleen and liver, and anemia [4].

(B) Cutaneous Leishmaniasis (CL)-Oriental sore: It is the most common form of Leishmaniasis and causes skin lesions without involvement of the mucosa, mainly ulcers, on exposed parts of the body, leaving life-long scars and serious disability [4].

(C) Mucocutaneous Leishmaniasis (MCL): MCL is due to L. braziliensis and L. Panamensis. It has two stages.

During the first stage, there is development of a primary cutaneouslesion, which eventually is followed by nasal mucosal involvement, later on destroying the nasal septum. During the second stage, disease can progress to lips, palate and larynx [4].

(D) Post Kala-Azar Dermal Leishmaniasis (PKDL): After a latent period of one year following kala-azar cure, skin lesionscan appear in around 20% of cases [4].

Case Definition:

1. Visceral Leishmaniasis (VL)

Suspected case: A Person with prolonged irregular fever >2 weeks, weight loss, splenomegaly, hepatomegaly, ascites, diarrhea, cough, anemia and bleeding etc.

Confirmed case: A suspected/ probable case of Visceral Leishmaniasis with serological/parasitological confirmation[5].

2. Cutaneous Leishmaniasis (CL)

Suspected Case: A person presenting with one or more lesions (skin or mucosal), skin lesions typically present on uncovered parts of the body; the face, neck, arms and legs which are the most common sites. The site of inoculation may present with a nodular appearance followed by indolent ulcer [5].

Probable case: A suspected case of VL with serological evidence of infection [5].

Confirmed case: A suspected/probable case confirmed by a positives mear or culture [5].

Diagnostic criteria:

(1) History of residence and travel to Leishmaniasis endemic areas

(2) Clinically compatible findings

(3) Laboratory confirmation

Note: In endemic malarious areas, visceral Leishmaniasis must be suspected when fever is not responding to anti-malarial drugs and persists for more than two weeks (assuming drug-resistant malaria has also been considered).

Specimen Collection:

Cutaneous Leishmaniasis: Skin biopsy is the standard dermatologic technique for obtaining specimen. No preservatives are required for examining LD bodies or for Leishmania culture [5].

Visceral Leishmaniasis: Collect 5ml of clotted blood or serum for serologic studies. Splenic or bone marrow aspirate collected in a tube with anticoagulant is required for the demonstration of amastigote. Specimen may be transported at room temperature without delay[5].

Lab diagnosis: Examination of slides (e.g. of biopsy specimens, impression smears, and dermal scrapings). Serologic testing for detection of antibodies against organisms useful primarily for visceral Leishmaniasis.

Culture: Aspirates of pertinent Tissue/fluid (e.g., skin lesion, bonemarrow, lymph node, blood/Buffy coat) [6].

Case Management: The treatment of Leishmaniasis depends on several factors including type of disease, concomitant pathologies, parasite species and geographic location. Leishmaniasis is a treatable and curable disease which requires an immuno competent system because medicines will not help rid parasites from the body, thus risk of relapse may occurs with immuno suppression of the patient. All patients diagnosed with visceral Leishmaniasis require prompt and complete treatment. Detailed information on treatment of the various forms of the disease by geographic location is available in the WHO technical report series 949,''Control of Leishmaniasis'' [7].

Prevention:

- The majority of the recommended precautionary measures are aimed at reducing the contact with phlebotomies (sand fly).
- Prevention of ACL is very similar to Malaria, as sand flies bite at night and indoors.
- Permethrin treated bed nets, should be used in endemic areas. Sand flies are generally more sensitive than mosquitoes toinsecticide, i.e. residual spraying of indoor rooms for vector control.
- Use of insecticide is unlikely to work in prevention of zoonotic Cutaneous, as the sand fly vector tends to bite outdoors, so the most effective strategy is to poison or dig up the burrows of reservoir rodents [6].

References: References are available in online version at www.nih.org.pk

MALARIA

Introduction: A vector borne parasitic disease transmitted by female Anopheles mosquito species. An estimated 98% of Pakistan population (185million) is at varying risk for Malaria while population at high risk is around 29% (54.6 million). Every year>3.6 million Malaria suspects are treated as Malaria cases in health facilities without confirmatory tests2.Epidemiologically, Pakistan is classified as a moderate malaria endemic country with a National API averaging at 1.08 (MIS, 2015) and wide diversity within and between the provinces and districts. Plasmodium Vivax and Plasmodium Falciparum are the only prevalent species of parasites detected so far, with P.vivax being the major parasite species responsible for>80% reported confirmed cases in the country

Clinical Picture: Fever, chills, sweats, headache, nausea and vomiting, body aches and general malaise.

Un-complicated: The classical (but rarely observed) Malaria attack lasts 6-10 hours. It consists of

- Cold stage (sensation of cold, shivering),
- Hot stage (fever, headaches, vomiting; seizures in young children),
- Sweating stage (sweats, return to normal temperature, tiredness).

Classically (but infrequently observed) the attacks occur every second day with the "tertian" parasites (P. falciparum, P. vivax, and P. ovale) and every third day with the "Quartan" parasite (P. malariae)

Complicated:

- Cerebral malaria, with abnormal behavior, impairment of consciousness, seizures, coma, or other neurologic abnormalities
- Severe anemia due to hemolysis
- Hemoglobinuria
- Acute respiratory distress syndrome (ARDS)
- Abnormalities in blood coagulation
- Low blood pressure caused by cardiovascular collapse
- Acute kidney failure

- Hyper parasitemia, where more than 5% of the red blood cells are infected by Malaria parasite
- Hypoglycemia

Infectious Agent:

- *Plasmodium falciparum*
- *Plasmodium vivax*
- *Plasmodium ovale*
- *Plasmodium malariae*
- *Plasmodium knowlesi (rarely infect humans)*

Note: First two of the above species are prevalent in Pakistan. Plasmodium falciparum is the most life threatening form of the disease, and other is P.vivax

Reservoir: Humans are only known reservoir

Mode of Transmission:

Bite of an infective female Anopheles mosquito and rarely through blood transfusion from infected person

Incubation Period: P. falciparum 9-14 days, P.malarie 18-40 days, P.ovale and P. vivax 12-18 days

Infectivity: Humans may infect mosquitoes as long as infective gametocytes are present in the blood. Anopheles mosquitoes remain infective for life

Seasonality: Malaria in Pakistan is typically unstable and major transmission period is post monsoon i.e. from August to November

Alert threshold: Number of cases reaches two times the mean number of suspected cases of the previous 3 weeks for a given location.

Outbreak threshold: In endemic area: Slide positivity rate above 50% or falciparum rate above 40%; while in non-endemic area, evidence of indigenous transmission of falciparum.

Case Definitions:

Suspected Case: A case with clinical manifestations of uncomplicated/complicated Malaria

Probable Case: A suspected case with history of similar manifestations among other household members

Confirmed Case: Clinical case with laboratory confirmation

Lab Confirmation:

- Peripheral blood smear (gold standard for identification of *Malarial parasite*, trophozoites and gametocytes, within RBCs)
- Rapid Diagnostic Test (Immunochromatography)
- PCR
- Serology (Indirect immunofluorescence and ELISA)

Note: Not for diagnosis of current infection; screening of blood donors, previously treated with questionable diagnosis and testing the patient from endemic area having recurrent / chronic Malaria infection.

Specimen Collection & Transportation:

Peripheral Blood Film: Collect 3-5ml blood in a tube with *anticoagulant* (EDTA). Immunodiagnostic test kit: Sample may also be used to demonstrate parasite antigen. Transport the specimen at room temperature preventing sample spillage or damage to the tubes.

Case Management:

Warning: Do not give Primaquine to pregnant women and children <2years of age and it is advisable to do a Glucose-6-phosphatede hydrogenase (G6PD) test before giving this drug. Give Primaquine preferably after the patient has recovered from the acute illness.

- Do not give undiluted Chloroquine or Quinine by I/M or I/Vroute, as it can cause sudden cardiac arrest, especially in children
- Do not give Sulfadoxine/Pyrimethamine to children <2 months of age or during first trimester of pregnancy
- Suspected/probable case of severe Malaria and high risk groups should be treated immediately .

Treatment of uncomplicated Falciparum Malaria:

Artemisinin-based combination therapies (ACTs) are there commended treatments for uncomplicated P. falciparum Malaria however Artemisinin and its derivatives should not be used as mono therapy. The following ACTs are recommended:

- Artesunate plus Sulfadoxine,
- Pyrimethamine Artemether plus lumefantrine,
- Artemether-lumefantrine is currently available as a fixed-doseformulation with dispersible or standard tablets containing 20mg of Artemether and 120 mg of lumefantrine. The recommended treatment is a 6-dose regimen twice Daily (BD)over a 3-day period. The dosing is based on the number of tablets per dose according to reported cases by month in Pakistan, pre-defined weight bands (5–14 kg: 1 tablet; 15–24kg: 2 tablets; 25–34 kg: 3 tablets; and > 34 kg: 4 tablets),
- In case of pregnant women, during first trimester Quinine plusClindamycin to be given for 7 days (Artesunate plusClindamycin for 7 days is indicated if this treatment fails.

Uncomplicated Vivax Infections: Chloroquine combined with Primaquine is the treatment of choice for Chloroquine-sensitive infections. Dosage is as given below:

- **Chloroquine:** 04 STAT, 02 after 6 hours, then 12 hourly for 02days.
- **Primaquine:** 0.25mg/kg body weight daily for 14 days7treatment is prescribed for radical treatment of Vivax.

Preventive Measures: Travelers and their advisers should note the four principles – the ABCD –of malaria protection:

Be Aware of the risk, the incubation period, the possibility of delayed onset, and the main symptoms.

- Avoid being Bitten by mosquitoes, especially between dusk and dawn.
- Use antimalarial dugs (Chemoprophylaxis) when appropriate, to prevent infection from developing into clinical disease.
- Immediately seek Diagnosis and treatment if a fever develops 1week or more after entering an area where there is a Malaria risk and up to 3 months (or, rarely, later) after departure from a risk area.

a) Personal protection

- Wear long sleeves and trousers outside the houses in the evening. Use repellent creams and sprays. Avoid night time outside activities.
- Use mosquito's coils or vaporizing mat containing a Pyrethrin.
- Use of Insecticide-treated mosquito nets (ITNs)

b) Vector control

- Indoor spraying with residual insecticides (IRS)
- Reduce mosquito breeding sites
- Improve vector surveillance
- Optimize the use of resources for vector control through Integrated Vector Management (IVM)

c) Chemoprophylaxis Malaria control Program:

Recommended chemoprophylaxis: Atovaquone-proguanil, Doxycycline or Mefloquine

References:

References are available at online version at www.nih.org.pk

MEASLES (RUBEOLA)

Introduction: Measles is a highly contagious viral disease mostly affecting children. Caused by measles virus of genus *Morbillivirus*. Despite community vaccination coverage, Measles outbreaks can occur among vaccinated children and remains an important cause of death among young children globally. The virus spreads via droplets from nose, mouth or throat of the infected person [1].Pregnant women while infected are also at greater risk of severe complications and the pregnancy may end in miscarriage or preterm delivery. Immunity after measles infection is life long, although there are few reports of measles re-infection. The case-fatality rate may be as high as 25% [2].

Clinical Picture: Cough, coryza, conjunctivitis, fever, rash, photophobia, muscle pain, sore throat, tiny white spots inside the mouth (Koplik's spots) etc. [3]. The occurrence of fever beyond the

3rd - 4th day of rash suggests a measles-associated complication. Measles can cause variety of clinical syndrome such as post measles infection(s) like pneumonia, lifelong brain damage / neurologic syndromes i.e. acute disseminated encephalomyelitis (ADEM) and Sub-acute Sclerosing Pan Encephalitis (SSPE), deafness and death [4].Severe measles is more likely among poorly nourished young children, especially those with insufficient vitamin A or whose immune systems have been weakened by other diseases [5].

Incubation period: Averages 14 days with a maximum range of 7-21 days [6].

Infectivity period: It can be transmitted by an infected person from 4 days prior to the onset of the rash to 4 days after the rash erupts [6].

Alert threshold: One suspected case is an alert [7].

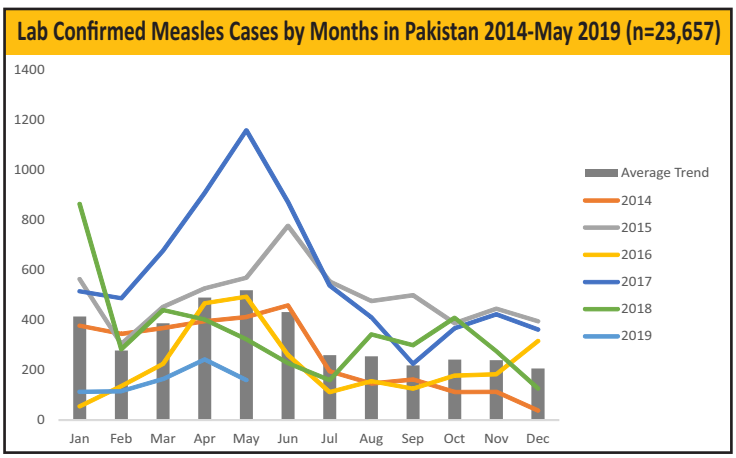
Outbreak threshold: Five or more clinical cases in a single location over a 30-daytime with at least one lab confirmed case is an outbreak. It requires an investigation and immediate response [7].

Case Definitions:

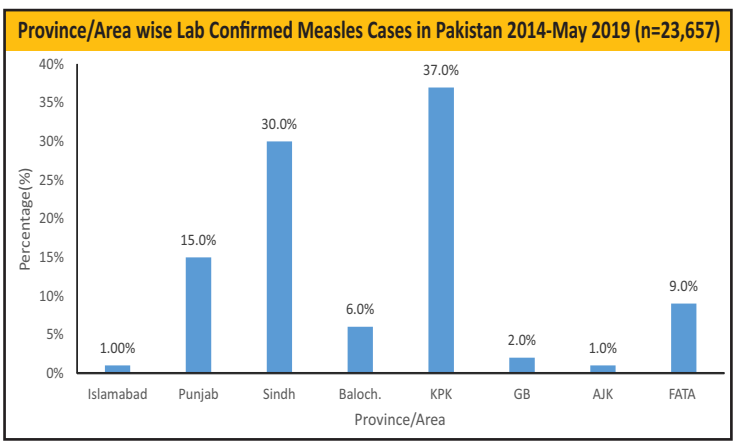
Suspected Case: A patient presenting with fever, generalized maculo papular rash with one of these: cough, coryza and conjunctivitis (3Cs) [8].

Confirmed Case: A suspected case, which is laboratory-confirmed or linked epidemiologically to a laboratory-confirmed case (positive IgManti bodies) [8].

Seasonality: Peak incidence in Pakistan is usually during April and May



Geographical Distribution in Pakistan: During 2014-19, Sindh and KPK remained the most effected provinces in Pakistan [9].



Specimen Collection & Transportation: Collect throat swab for virus isolation, very early in the rash phase and preserve in Viral Transport Medium (VTM). Five samples should be taken from fresh cases, less than five days from rash onset, in documented outbreaks. Collect 5ml blood for serology. Store serum at 4-8°C and not for more than 48 hours. Do not freeze the whole blood. Transport the specimens in triple packaged with complete request form by maintaining cold chain at 4-8°C [8].

Laboratory diagnosis: WHO recommends ELISA as the gold standard for Measles diagnosis. Anti-measles IgM is detectable in 3 - 30 days after the appearance of the rashes. Anti-measles IgG is undetectable up to 7 days after rash onset and subsequently peaks about 14 days after the appearance of skin rashes [8].

Prevention and Control Measures: Immunize population at risk as soon as possible. Priority is to immunize children of age 6 months to 5 years, regardless of vaccination status or history of disease. Children who are vaccinated against measles before or at 9 months of age must receive a 2nd dose of measles vaccination at 15 months of age [6].

Treatment:

Uncomplicated cases: The treatment is mainly supportive which includes antipyretics, fluids and antibiotics for only bacterial super infection(s). The WHO recommend Vitamin- A supplementation for 2days with the dose of 50,000IU in <6 months, 100,000 IU in 6-11months, 200,000IU in >12 months and for children with ophthalmologic evidence of Vitamin- A deficiency, doses should be repeated on day 2 and 28. Antibiotics should be prescribed to treat eye and ear infections, and pneumonia [10].

Complicated cases: Pneumonia complicated cases should be referred to the health care facility immediately after Vitamin- A supplementation [10].

References: References are available in online version at www.nih.org.pk

POLIOMYELITIS

Introduction: A potentially fatal viral infectious disease that affects nerves causing partial or full paralysis among a proportion of infected children; mainly children under 5 years of age (1). Once affected, the paralysis has no cure, but it can be easily prevented through safe and effective vaccines administered orally (OPV) as well as through injections (IPV).

The disease is marked for global eradication through the World Health Assembly resolution in 1988. The efforts so far reduced endemic countries from 125 to only 3 including Pakistan, Afghanistan and Nigeria. The annual case count during the time has been reduced from over 350,000 to only 33 in 2018.

Polio was declared as a Public Health Emergency of International Concern (PHEIC) by WHO on 5th May, 2014 and continues to stay as such till date. The Government of Pakistan has also declared polio as a national public health emergency and an annually updated National Emergency Action Plan is implemented nationwide under the overall supervision of the National Task Force led by the Prime Minister and having on board all provincial Chief Ministers as well as the Prime Minister of AJK.

Case Breakdown by Country since 2012

Province/Area	2012	2013	2014	2015	2016	2017	2018	2019*
Islamabad	0	0	0	0	0	0	0	0
Punjab	2	7	5	2	0	1	0	3
Sindh	4	10	30	12	8	2	1	3
KPk	27	11	68	17	8	1	2	23
Balochistan	4	0	25	7	2	3	3	0
GB	1	0	0	0	0	1	0	0
AJK	0	0	0	0	0	0	0	0
FATA (KPTD)	20	65	179	16	2	0	6	8
Total	**58**	**93**	**307**	**54**	**20**	**8**	**12**	**37**

Clinical Picture: There are three basic patterns of Polio infection: subclinical, non-paralytic, and paralytic. Most infections remain asymptomatic but Wild Poliovirus may cause Acute Flaccid Paralysis (AFP); one in 200 infections. The onset of asymmetric paralysis is usually sudden and is coupled with fever. The severity of weakness also varies with levels of immunity among the affected child rendered through immunization. Weakness is ascending and may vary from one muscle or group of muscles, to quadriplegia, and respiratory failure. Proximal muscles usually are affected more than distal muscles and

legs more than arms. Reflexes are decreased or absent while sensory examination may be normal.

Infectious agent: Poliovirus belong to genus *Enterovirus* subgroup, family *Picornaviridae,* having three serotypes; labelled P1, P2, and P3..

Reservoir: Humans are the only known reservoir (7).

Mode of transmission: Primarily person to person spread through the fecal-oral route. After initial infection with poliovirus, the virus is shed intermittently in faeces for several weeks.

Incubation Period: 7 -14 days for paralytic cases (range 3 - 35 days)

Alert & Outbreak Threshold: One suspected case of polio is an alert/outbreak and requires an immediate notification and stools sample collection for confirmation.

Case Definitions:

Suspected Case:

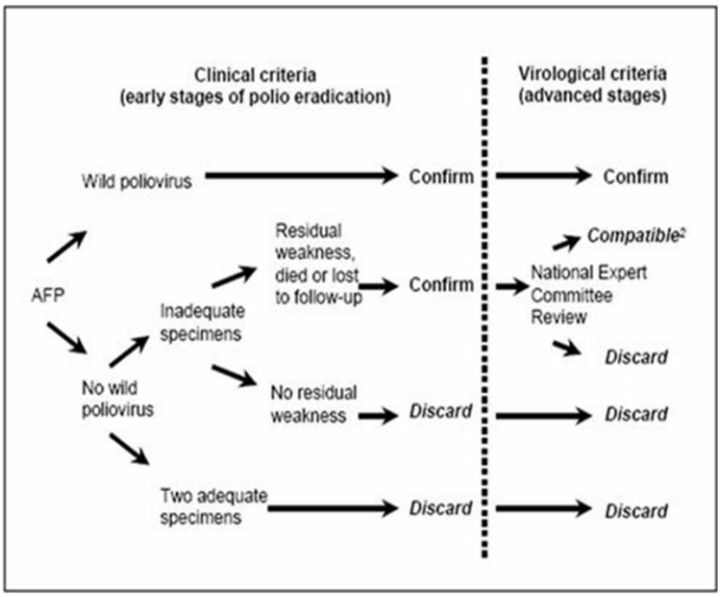
Sudden onset of weakness and floppiness in a child aged <15 years, OR any person of any age with paralytic illness if polio is suspected.

Polio-compatible AFP:

A case in which adequate stool specimen could not collected from a probable case within 2 weeks of the onset of paralysis, and there is either an acute paralytic illness with polio-compatible residual paralysis at 60 days, or death takes place within 60 days, or the case is lost to follow-up.

Confirmed Polio case:

A case with acute paralytic illness, with or without residual paralysis, and isolation of wild poliovirus from the stools of either the case or its contacts.



Specimen Collection & Transportation:

Collect 2 stool samples (at an interval of 24 to 48 hours) for virus isolation as soon as possible or within 14 days of onset of illness in a clean, leak proof, screw- capped container with a transport medium. Seal the container with tape and place samples immediately after collection in refrigerator at 2-8°C or in a cold box with frozen ice packs. Transport specimens to the lab maintaining cold chain with duly filled request form within 72 hours after collection. The set of specimens from a single patient should be placed in a single plastic bag just large enough to hold both the containers.

Public Health Measures:

1. Achieving a high level of coverage with at least 4 doses of the oral poliovirus vaccine (OPV) and one dose of IPV in routine.
2. Providing supplementary doses of OPV to all children <5years old during NIDs, SNIDs as well as the case response planned by the Polio Eradication Programme
3. Active and Passive Surveillance for all suspected cases of acute flaccid paralysis as well as from the sewerage sample collection
4. Community awareness about vaccination as well as the safe eater and sanitation.

References: References are available in online version at www.nih.org.pk

TYPHOID

Introduction: Typhoid fever, also known as enteric fever, is a potentially severe and occasionally life-threatening febrile illness, occurs predominantly in association with poor sanitation and lack of clean drinking water. According to the most recent estimates (2014), approximately 21 million cases and 222,000 typhoid-related deaths occur annually worldwide. More than 80% of reports of typhoid fever and > 90% of reports of paratyphoid fever caused by Salmonella Paratyphi A are of travelers to southern Asia.

Pakistan is located highly in endemic region and with highest incidence rate 451.7 per 100,000 persons per year of typhoid fever cases.

In Pakistan the first large-scale emergence and spread of a novel *S. typhi* clone harbouring resistance to three first-line drugs (Chloramphenicol, Ampicillin, and Trimethoprim-Sulfamethoxazole) as well as Fluoroquinolones and third-generation Cephalosporin has been identified in Sindh, which was classified as extensively drug resistant (XDR).

From November 2016 to March 2019, there are more than 5000 confirmed XDR Typhoid cases have been reported from the Sindh region, primarily in the cities of Karachi and Hyderabad. Now cases are being reported from other parts of the country as well. Additionally, travel associated XDR typhoid cases have been identified abroad as well.

Clinical Picture: The acute illness is characterized by prolonged fever, headache, nausea, loss of appetite, and constipation or sometimes enteric. Symptoms are often non-specific and clinically non-distinguishable from other febrile illnesses. Complications includes liver disease. While paratyphoid fever can result in death, this is rare in treated cases.

Infectious Agent: Typhiod fever: *Salmonella enterica serovar typhi*.

Paratyphoid fever: *Salmonella Paratyphi* A, B or C.

Reservoir: Humans are the only reservoir for Salmonella typhi, whereas *Salmonella paratyphi* has animal reservoirs.

Mode of transmission: Faecal-oral route, particularly ingestion of water and food contaminated by faeces and urine of patients and carriers (1).

Incubation period: Ranges from 8-14 days but may be from 3 days up to two months (2).

Infectivity: The disease is communicable for as long as the infected person excretes *S.typhi* in their excreta, usually after the 1st week of illness through convalescence. Approximately 10% of untreated cases will excrete *S. typhi* for 3 months and between 2-5% of all cases become chronic carriers.

Seasonality: April to August, Moonsoon season

Alert Threshold: The alert threshold for typhoid is 1 case. The action threshold is 5 suspected cases per 50,000 population.

Case Definitions:

Suspected Cases: Any person with acute illness and fever of at least 38°C for 3 or more days with abdominal symptoms; diarrhea, constipation, abdominal tenderness, prostration and relative bradycardia

Probable Case: A suspected case with a positive sero-diagnosis or antigen detection test but no *S. typhi* isolation.

A clinical compatible case that is epidemiologically linked to a confirmed case in an outbreak.

Confirmed Case: A suspected/probable case that is laboratory confirmed by: Isolation of *Salmonella typhi* from blood, stool or urine specimens.

Chronic Carrier: An individual excreting *S. typhi* in the stool or urine for longer than one year after the onset of acute typhoid fever. (1-5% of patients, depending on age, become chronic carriers harboring

S.typhi in the gallbladder).

Lab confirmation:

- Blood & Stool Culture
- Serum (Typhi-dot)
- BM R/E: Testing a sample of bone marrow is a more accurate way of diagnosing typhoid fever (90% sensitive)

Specimen Collection:

Blood: Collect 10-15 ml of blood from school children and adults in order to achieve optimal isolation rates; 2-4 ml is required from toddlers and preschool children.

For blood culture inoculate media at the time of drawing blood. Once specimens are inoculated, blood culture bottles should not be kept cold. They should be incubated at 37°C or in tropical countries at room temperature, before being processed in the laboratory.

Serum: Collect 1-3 ml of blood inoculated in a tube without anticoagulant for serological purposes.

Stool: Collect stool sample in a sterile wide-mouthed plastic container from acute patients, which is useful for the diagnosis of typhoid carriers.

Timings:

Serology: First sample should be collected at the time of presentation and a second sample, if possible, should be collected at the convalescent stage, at least 5 days later.

Storage:

Blood: Culture bottles should be inoculated at 37°C/ room temperature intropical countries.

Serum: Separate serum after clotting and store in aliquots of 200 ml at +4°C.

Testing can take place immediately or storage can continue for a week without affecting the antibody titer. For longer storage the serum may be frozen at -20°C.

Stool for culture: Specimens should preferably be processed within two hours after collection. If there is any delay, then stored at 4°C or in a cool box with freezer packs.

Packaging & Transportation: Blood culture bottles should be transported to the referral laboratory at ambient temperature.

Rectal swabs inoculated into Carry Blair transport medium, properly packed (Triple Packaging) and should be transported to the lab in a cool box.

Case Management:

Uncomplicated: Quinolones (Ciprofloxacin, 750 mg orally twice daily or Levofloxacin 500 mg once daily 10-14 days for severe infection) are the drugs of choice. Cefixime 20mg/kg for children.

Complicated: Quinolones (Ciprofloxacin 750mg orally twice daily for10-14 days)

Extensively Drug Resistant (XDR) Typhoid Fever: The antibiotic resistance strains have been treated with Azithromycin and Meropenem. Typbar-TCV vaccine, a trivalent conjugate vaccine that was recently prequalified by the World Health Organization, is recommended. The vaccine has long-lasting immunity, requires only one dose.

Supportive Care: Oral or intravenous rehydration, antipyretics and appropriate nutrition also play an important role(3).

Preventive measures & vaccination:

General Preventive measures: Avoiding contaminated food and water, raw vegetables and fruits that can't be peeled off. Avoiding half cooked foods. Typhoid vaccination (vaccine not recommended in children less than 2 years of age)

Preventive Measures during outbreaks: Outbreaks may occur through person-to-person contamination (faecal-oral transmission via contaminated hands or instruments), and direct faecal contamination of untreated water.

Note: Investigations must pinpoint the source and mode of infection transmission to identify corrective measures for application (chlorination/boiling of water, selective elimination of suspected food). Inform the health authorities if one or more suspected cases are identified. Confirm the outbreak, Confirm the diagnosis and ensure prompt treatment. Mass immunization during sustained, high incidence epidemics.

Advisory link: https://www.nih.org.pk/wp-content/uploads/2019/02/Advisory-for-Typhoid-5-oct.pdf

References: References are available in online version at www.nih.org.pk

HEPATITIS A&E

Introduction: Acute viral hepatitis is a diffuse liver inflammation caused by specific hepatotropic viruses that have diverse modes of transmission. Hepatitis A and E infections are endemic in Pakistan. Both infections occur in their sporadic form due to poor water and sewage systems (1).

Clinical Picture: Acute jaundice, dark urine, anorexia, malaise, extreme fatigue and right upper quadrant tenderness. Biological signs include increased urine Urobilonogen and >2.5 times the upper limit of SerumAlanine Aminotransferase. A variable proportion of adult infections are symptomatic (2).

Infectious Agent:

- Hepatitis viruses A
- Hepatitis viruses E

Reservoir: Humans are the only reservoir of the Hepatitis A virus (HAV). Humans and Non-human Primates are the reservoir of Hepatitis E(HEV)(3).

Mode of transmission: Faecal-oral route

Incubation period: Hepatitis A: Average 28-30 days, ranges from 15 to 50 days. Hepatitis E: range is 15-64 days

Seasonality: Occur regularly during monsoon rains and floods due to major contamination of drinking water with sewage

Alert Threshold: 3 or more cases in one location

Outbreak threshold: A cluster of cases: 6 or more cases in one location +Lab confirmation of type of Virus

Case Definitions:

Suspected Case: A case that is compatible with the clinical description

Confirmed Case: A suspected case that meets the clinical case definition AND is laboratory confirmed.

OR

A case compatible with the clinical description who has an epidemiological link (i.e. household or sexual contact) with a laboratory-confirmed case of hepatitis A during the 15-50 days before the onset of symptoms.

Lab confirmation:

Hepatitis A positive for IgM anti-HAV Hepatitis E positive for IgM anti-HEV

Specimen Collection: Collect 5 ml blood during acute phase of illness observing all safety precautions. Separate serum by centrifugation technique in a tube.

Timings: Batch the specimens and send by overnight as soon as possible via courier.

Packaging: An insulated box with ice or frozen refrigerant packs (4).

Storage and Transportation: Transport serum specimens either refrigerated (for serology) or frozen (for antigen detection by PCR) with complete lab request form.

Case Management:

- There is no specific management for acute uncomplicated hepatitis, but general supportive measures are recommended like bed rest, fluid replacement, nutritional support, and avoidance of all the hepatotoxic drugs during the illness.
- Regarding Hepatitis E, hospitalization is required for Fulminant Hepatitis and should be considered for infected pregnant women(5).

Preventive measures:

- Control procedures for Hepatitis A and E, epidemic-prone diseases, should include.

- Provision of safe drinking water and proper disposal of sanitary waste.
- Good personal hygiene including frequent and proper hand washing after bowel practices and before food preparation,
- Avoiding drinking water and/or ice of unknown purity and avoiding eating uncooked fruits or vegetables that are not peeled, high quality standards for public water supplies and proper disposal of sanitary waste are important measures to reduce the risk of disease transmission.

Vaccination: Hepatitis A vaccine is available both for adults and children aged 2 years or older and is administered I/M with a recommended vaccination schedule of 0, 1, and 6-12 months apart. At present, no commercially available vaccines exist for the prevention of hepatitis E.

References: References are available in online version at www.nih.org.pk

National Public Health Events

The human immunodeficiency virus (HIV)

Acquired Immunodeficiency Syndrome & Human Immunodeficiency Virus: The human immunodeficiency virus (HIV) infects cells (CD4 cell a type of T cell) of the immune system, destroying or impairing their function. Infection with the virus results in progressive deterioration of the immune system, leading to "immune deficiency." The immune system is considered deficient when it can no longer fulfill its role of fighting infection and disease. Infections associated with severe immunodeficiency are known as "opportunistic infections", because they take advantage of a weakened immune system. Acquired immunodeficiency syndrome (AIDS) is a term which applies to the most advanced stages of HIV infection and is often characterized by the presence of any of the more than 20 associated opportunistic infections, complications or cancers.

Present Situation in Pakistan: According to National AIDS Control Program, in Pakistan, there are more than 1650000 People Living with AIDS. HIV/AIDS is endemic in many parts of Pakistan. In most recent outbreak of Ratodero, Sindh till June 21, 2019 there have been 812 suspected HIV positive cases reported. Including 668 children and 144 adults. All suspected HIV cases were referred to HIV treatment center for confirmation. Till date 515 Children have been confirmed positive and linked to HIV treatment center. Similarly, 108 adults have been declared HIV positive and linked HIV treatment center.

Preventive measures and control: Promote Injection Safety practices which encompasses safe medical injections, safe phlebotomy practices, safe disposal of sharp and healthcare waste. Reduce sexual transmission of HIV by the uptake of appropriate HIV preventive measures including safe sex practices and promotion of the use of condoms. Modify the risk behavior of people in the community through “behavior change communication” (BCC). STI control specially for sex workers, using the syndromic STI management approach with partner notification and promotion of safer sex. Preventing the transmission of HIV through infected pregnant women to infants by the use of antiretroviral therapy (ART) i.e. Teneforvir, Emtricitabine and Raltegravir throughout pregnancy. Women who have not been received ART during pregnancy should be given intravenous Zidovudine during labor and the neonate should be given oral Zidovudine for duration of 6 weeks. Unnecessary obstetrical invasive procedures such as artificial rupture of membranes or episiotomy should be avoided. Occupational exposure: If a person has had occupational exposure to HIV, the following regimen is preferred; Emtricitibine plus Tenofovir along with Raltegravir or Dolutegravir for a duration of 4 weeks depending on the type of exposure.

Primary Amebic Meningoencephalitis (Naegleria fowleri)

In Pakistan, according to International Journal of Infectious Disease (IJID) as many as 30 cases of Naegleria were reported in Karachi from 2015 to 2018. In current year 03 fatal cases have been reported from Karachi.

Primary Amebic Meningoencephalitis (PAM) is caused by parasite *Naegleriafowleri;* a rare, with about 99% CFR. *Naegleriafowleri* "brain-eating amoeba” is a unicellular, free-living microscopic organism& grows best at higher temp. Up to 46°C & is naturally found in warm freshwater environments feeding on bacteria and other microbes. Transmission occurs primarily through inhalation of infested water during swimming or putting contaminated water in to the nose during ablution. Symptoms start 1-9 days (median 5 days) after nasal exposure to Naegleria-containing water. People may die 1-18 days (median 5 days) after symptoms begin.

Initial symptoms of PAM usually start from 1-7 days after infection which may include headache, fever, nausea or vomiting.

Clinical manifestations are similar to bacterial meningitis (severe frontal headache, fever, vomiting, meningeal signs, stiff neck, seizures and focal neurologic deficits) with increase chances of misdiagnosis. After the start of symptoms, the disease progresses rapidly and while death may occur in 1-12 days of illness, Because of rapid progression, the diagnosis is usually made after death.

Prevention & Control: Both trophozoites and cysts forms are sensitive to adequate levels of chlorination. The municipality public health authorities, therefore must ensure that adequate levels of disinfectants like chlorine are maintained in the supplied tap water along with strict monitoring arrangements. Any of the suspected cases should immediately be reported to health authorities. Awareness and education in the affected areas must also be undertaken to educate and sensitize communities on preventive measures.

Heat Stroke

Introduction: Heat stroke is a medical emergency and is a form of hyperthermia in which the body temperature elevates dramatically and can be fatal if not promptly and properly treated. The body's temperature rises rapidly, the sweating mechanism fails and the body becomes unable to cool down consequently, the body temperature can rise to 106°F or higher within 10 to 15 minutes.

Signs & Symptoms: It include profuse sweating or the absence of sweating, with hot red or flushed dry skin, weakness/ lethargy, chills, throbbing headache, high body temperature, hallucinations, confusion/ dizziness and slurred speech. Heat stroke can cause death or permanent organ damage or disability if not properly treated in time. Infants, elder persons, athletes and outdoor workers are at high risk for heat stroke.

Treatment: Victims of heat stroke must receive immediate treatment. If a person shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The most critical step is the lowering of the temperature of the patients. The patients should be moved to shady area, unnecessary clothing should be removed and cool tap water should be applied to the skin while soaking remaining clothes with water. Notify the emergency services immediately as severe cases often require hospitalization and Intravenous re-hydration. Promote

sweat evaporation by placing the patient before fan and ice packs under the armpits and groin. If the patient is able to drink liquids, he / she should be given plenty of cool water or other cool beverages that do not contain alcohol or caffeine. Maintain intravenous fluids and hospitalize if required. Monitor body temperature with a thermometer and continue cooling efforts until the body temperature drops to101°F to 102°F. Antipyretics may be given once the body temperature drops to 101°F or below.

Preventive Measures: Heat / sun stroke is a preventable condition. Public should be educated through awareness messages to drink plenty of water while limiting time in direct sunlight in hot / humid weather or in places with high environmental temperatures, avoid becoming dehydrated and to refrain from vigorous physical activities in hot and humid weather. Public should be made aware of early signs / symptoms of dehydration and subsequent evolving signs and symptoms of heat / sun stroke such as muscle cramps, nausea, vomiting, light-headedness and even heart palpitations. Persons working under the sun should prevent dehydration and heat stroke by taking time out of the sun and drinking plenty of water / fluids. The patients should avoid use of alcohol and caffeine containing soft drinks and/or tea, which may exacerbate dehydration. Public should be encouraged to consume salty foods, wear hats and light-colored, lightweight and loose clothes during the hot / humid environmental conditions.

International Public Health Events

Ebola Virus Disease (EVD)

Ebola Virus Disease (EVD) or Ebola hemorrhagic fever (EHF) is the most virulent human viral hemorrhagic disease caused by the *Ebola virus*; with the average case fatality rate is around 50%. Symptoms may appear from 2 to 21 days after exposure which typically include fever, headache, joint and muscle aches, weakness, diarrhea, vomiting, stomach pain and lack of appetite and may be followed by rash, red eyes, difficulty breathing, difficulty swallowing, bleeding from different sites of the body. A person infected with Ebola virus is not contagious until symptoms appear. Ebola cannot spread through the air, food and water. The virus can spread through direct contact with the body fluids/secretions of an infected person. No specific drug available, however early supportive clinical treatment and management are essential and can improve the chances of recovery. The outbreak of Ebola virus disease began in West Africa mainly affecting Guinea, Liberia and Sierra Leone in December 2013 and declared as Public Health Emergency of International Concern (PHEIC) by WHO.

On 8 May 2018, the Ministry of Health (MOH) of the Democratic Republic of the Congo (DRC) officially declared an outbreak of Ebola virus disease in Bikoro Health Zone, Equateur Province. This is the ninth outbreak of Ebola virus disease over the last four decades in the Democratic Republic of Congo, with the most recent occurring in May 2017. In May 2018, cases erupted from the same area and as of 11 June, there were a total of 59 confirmed, probable and suspected Ebola cases, of which 28 people had died.

Risk assessment: The risk is low at global level due to the remoteness and inaccessibility of the area as well as the rapid response launched by the MoH of DRC, WHO, and all the other coordinating partners.

Public Health Measures: WHO recommends the implementation of proven strategies for the prevention and control of Ebola outbreaks. These strategies include (1) coordination of the response, (2) enhanced surveillance, (3) laboratory confirmation, (4) contact identification and follow-up, (5) case management, (6) infection prevention and control, (7) safe and dignified burials, (8) social mobilization and community engagement, (9) logistics, (10) risk communication, (11) vaccination, (12) partner engagement, (13) research and (14) resource mobilization.

Middle East Respiratory Syndrome Coronavirus (MERS - CoV)

Introduction: First reported case of MERS-CoV was from Saudi Arabia in September 2012. So far, all cases of MERS have been linked through travel to or residence in countries in and near the Arabian Peninsula. MERS is a viral respiratory illness caused by *corona virus* from the same family which caused outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003. The source of the virus remains unknown but virological studies point towards dromedary camels. MERS-CoV has spread from ill people to others through close contact, such as caring for or living with an infected person. Its Incubation period is 1-2 weeks. The clinical presentation of MERS ranges from asymptomatic to very severe pneumonia with acute respiratory distress syndrome, septic shock and multi-organ failure resulting in death. The clinical course is more severe in immune-compromised patients and persons with underlying chronic co-morbidities. Human-to-human transmission has occurred mainly in health care settings. Mass gathering events such as the Hajj provide a basis for communicable diseases to spread easily. In the wake of incidence of MERS-CoV cases in KSA, its travel associated international spread and the upcoming Hajj seasons, it is imperative to institute effective prevention and control measures among Pakistani pilgrims. Pilgrims with pre-existing medical conditions such as diabetes, chronic lung disease and immunodeficiency should consult their Physicians before travelling to assess whether making the pilgrimage is advisable for them or not.

Sample Collection and Transportation: Collection of lower respiratory specimens (sputum or broncho-alveolar lavage) is strongly recommended however, nasopharyngeal swab, oropharyngeal swab, sputum, serum, and stool/rectal swab may be collected. Repeat sequential sampling for PCR testing is strongly encouraged in the respiratory tract (upper and lower) and multiple other body compartments. Wear personal protective equipment and adhere to infection control precautions and notify to district health departments immediately if suspect MERS-CoV infection in a person.

Treatment and Prevention: No specific treatment/ drugs and vaccines are currently available. Treatment is mainly supportive and based on the clinical condition of the patient. Preventive measures include standard plus aerosol, droplet precautions and practicing good hand hygiene.

Guidelines link: https://www.nih.org.pk/wp-content/uploads/2018/03/Guidelines-for-the-Prevention-Control-and-Management-of-Middle-East-Respiratory-Syndrome-Coronavirus-MERS-CoV-updated-MAY-2014.pdf

Nipah Virus

Introduction: Nipah Virus (NiV) is an emerging zoonosis that causes severe anomaly in both animals and humans. It is endemic in South-East Asia Region. NiV was initially isolated and identified in 1999 during an outbreak of encephalitis and respiratory illness among pig farmers and people with close contact with pigs in Malaysia and Singapore.

Clinical Picture: Encephalitis: Fever and headache, followed by drowsiness, disorientation and mental confusion. These signs and symptoms can progress to coma within 24-48 hours. Some patients may have a respiratory illness/Influenza like Illness.

Long-term sequelae following Nipah virus infection have been noted, including persistent convulsions and personality changes. Its outbreaks in

South-East Asia occurred during winter and spring (December-May).

Diagnosis & Specimen Collection:

- RT-PCR
- Serological testing by (IgG and IgM by ELISA)
- Virus Isolation
- Histopathology and Immunohistochemistry (IHC) on tissues collected.

Specimen is collected by PCR Throat and nasal swabs, cerebrospinal fluid, urine and blood & Serology: At least 5 ml of serum required for serological testing.

Packaging and Transportation: Tissues were either fixed in 10% neutral buffered formalin for 48 h prior to histological processing or submerged in RNA or viral transport medium and then stored at −80°C until processing for RNA or viral isolation, respectively. It is transported by viral medium.

Treatment & Preventive Measures: Treatment is mostly focused on managing fever and the neurological symptoms. Supportive Care including Ribavirin may alleviate symptoms of nausea, vomiting and convulsions (Limited data available). Severely ill individuals need to be hospitalized and may require use of ventilator. No vaccination for human use is available. It can be prevented by avoiding exposure to sick pigs and bats in endemic areas and avoiding drinking raw date palm sap. Raising public awareness of transmission and symptoms is important in reinforcing standard infection control practices to avoid human-to-human infections in hospital setting.

Mosquito Alert Pakistan ماسکیٹو الرٹ پاکستان

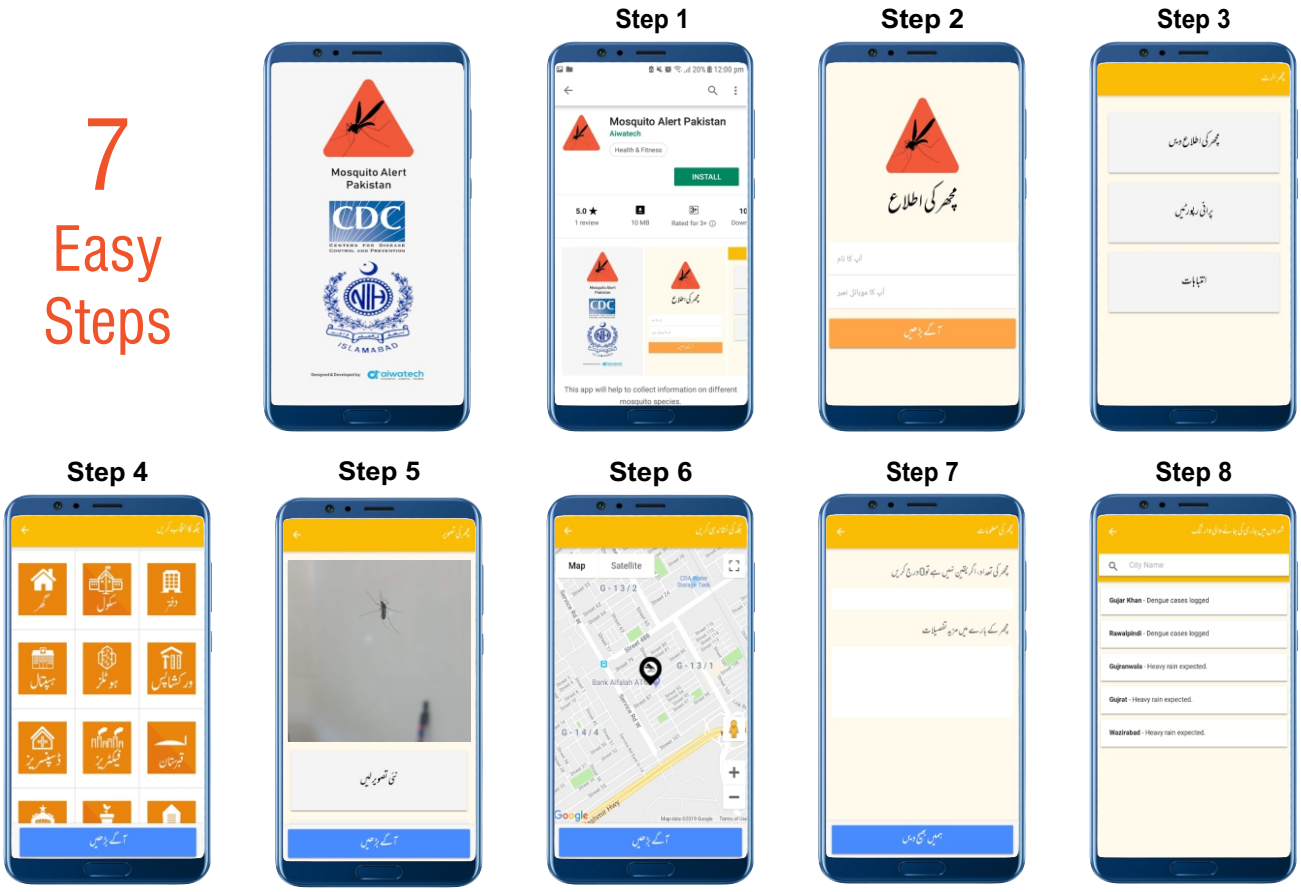
GET IT ON Google Play

The National Institute of Health (NIH) has launched its first-ever android-based application named “Mosquitoes Alert Pakistan”. The app will help to collect information on different mosquito species present in different areas which will ultimately help in mapping out the magnitude of burden related to different mosquito species.

Through this Mosquito Alert app, anyone can send photo of mosquitoes or breeding places. These photos will be part of a common database and will be used for investigation, monitoring and control of mosquitoes.

This information is key for generating a participatory alert system to improve the management of mosquito’s species, minimize the risk of disease transmission and raise awareness among general public. Link of app: https://maa.nih.org.pk/

7 Easy Steps



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